

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 03 038 WO		<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/DK2004/000219		International filing date (day/month/year) 30.03.2004		Priority date (day/month/year) 07.04.2003
International Patent Classification (IPC) or national classification and IPC A23G9/04, A23G9/14, A23G9/22				
Applicant TETRA LAVAL HOLDING & FINANCE S.A.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand  31.01.2005		Date of completion of this report  04.07.2005		
Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Boddaert, P  Telephone No. +31 70 340-3471		



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/DK2004/000219

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-12 as originally filed

**Claims, Numbers**

1-15 filed with telefax on 31.01.2005

**Drawings, Sheets**

1/4-4/4 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V - Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-15
	No: Claims	
Inventive step (IS)	Yes: Claims	1-15
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-15
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

D1 : PATENT ABSTRACTS OF JAPAN vol. 0050, no. 85 (C-057), 3 June 1981  
(1981-06-03) -&; JP 56 029962 A (ICHIHARA TAKUZO), 25 March 1981  
D2 : WO 97/39637 A (UNILEVER PLC ; UNILEVER NV (NL)) 30 October 1997  
D3 : US 5 024 066 A (GOAVEC JEAN-JACQUES) 18 June 1991 (1991-06-18)

Document D1 discloses (abstract , figure , claims) an apparatus for the production of ice cream comprising a first through flow freezer (1) for the cooling of a continuous flow of mass to about -10°C , a second through flow freezer (20) for further cooling of the continuous flow of mass to a lower temperature (-20°C).

Document D2 discloses (figure , page 3) an apparatus for the production of ice cream with solid ingredients comprising a freezer-barrel for the cooling of a continuous flow of mass and a mixing in arrangement near the end of the barrel (page 3 lines 16-19) for introducing fruit bits or nuts to the frozen ice cream. At the end of the screw the mass is extruded.

Document D3 discloses (figures , col.2 , claims) an apparatus for the production of ice cream comprising a first through flow part (1) with a refrigerating jacket (col.2 l.28,29) suitable for the cooling of a continuous flow of mass , and a second through flow-freezer for further cooling of the continuous flow of mass to a lower temperature , and a mixing in arrangement (col.2 l.51-54) between the first through flow system and the second through flow systemt , for introducing solid particles to the ice cream.

Document US5024066 (D3) is considered to represent the most relevant state of the art , from which the subject-matter of claim 1,15 differs in that a first through-flow freezer is provided for cooling a continuous flow of mass to between -1°C and -10°C at its outlet.

The subject-matter of claims 1,15 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as the provision of a system for mixing-in of solid ingredients in the frozen ice cream mass when it has a temperature between -1°C and -10°C , where the viscosity is lower and thereby reducing the consumption of mechanical energy for mixing-in and distribution of the solid ingredients , and reducing the increase in temperature of the ice cream mass thereby.

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In D1 no hint is given that would solve the problem. Also none of the other prior art documents would lead the skilled person to the solution stated above.

Thus the subject-matter of claims 1,15 also involves an inventive step (Article 33(3) PCT).

Claims 2-14 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

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AMENDED CLAIMS

FILED 31 JANUARY 2005

- 5 1. Apparatus for the production of ice-cream mass with solid ingredients, which comprises
- a first through-flow freezer (1) for the cooling of a continuous flow of mass to between -1°C and -10°C, preferably between -3°C and -7°C, at the outlet of the first through-flow freezer (1),
- 10 a second through-flow freezer (7) for further cooling of the continuous flow of mass, and
- a mixing-in arrangement (6) for the mixing of solid ingredients into the continuous flow of mass between the first through-flow freezer (1) and the second through-flow freezer (7).
- 15 2. Apparatus according to claim 1, where the second through-flow freezer (7) cools the mass to between -10°C and -20°C, preferably between -12°C and -16°C, at the outlet of the second through-flow freezer (7).
- 20 3. Apparatus according to claim 1 or 2, where the mixing-in arrangement comprises a wing pump (6).
4. Apparatus according to any of the claims 1-3, where the second through-flow freezer (7) comprises a freezing cylinder with an inner, rotation-symmetrical freezing
- 25 surface which is regularly scraped by rotation of a scraping arrangement (8).
5. Apparatus according to claim 4, where the scraping arrangement (8) is a conveyor screw which comprises a plurality of screw flights (13-20), each of which extends in a helical path around a longitudinal axis, where at least two screw flights (13-16)
- 30 extend over the same part of the longitudinal extent of the conveyor screw, and

wherein the outer edges of the two screw flights (13-16) extend at different radial distance from the longitudinal axis.

5 6. Apparatus according to claim 5, wherein the said least two screw flights (13-16) extend over an inlet end part of the conveyor screw.

7. Apparatus according to claim 6, wherein at least three screw flights (13-16) extend over the inlet end part of the conveyor screw, and where one of the least three screw flights (13) extends at a greater radial distance from the longitudinal axis than the  
10 least two other screw flights (14-16).

8. Apparatus according to claim 7, wherein the at least two screw flights (14-16) which extend at a smaller radial distance from the longitudinal axis extend from the inlet end and at different longitudinal distance from the inlet end.  
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9. Apparatus according to any of the claims 5-8, where the pitch of the screw flights (13-16) at the inlet end of the conveyor screw is 0.9 to 1.4, preferably 1.1 to 1.3.

10. Apparatus according to any of the claims 5-9, wherein the pitch of the screw  
20 flights (17-20) decreases along the length of the conveyor screw to 0.7 to 1, preferably 0.8 to 0.9, at an outlet end of the conveyor screw.

11. Apparatus according to any of the claims 5-10, wherein at all places along the length of the conveyor screw there is at least one screw flight (13, 17-20) which  
25 extends at a given greater radius, so that the whole of the inner wall of a cylindrical cavity in which the conveyor screw is placed is scraped by rotation of the conveyor screw.

12. Apparatus according to any of the claims 5-11, wherein the screw flights (13, 17-  
30 20) which extend at a greater radial distance from the longitudinal axis extend

discontinuously in the longitudinal direction, so that a peripherally extending opening exists between these screw flights (13, 17-20) at least at one position along the longitudinal direction.

- 5 13. Apparatus according to claim 12, wherein said opening or openings extend over 120 to 240° of the periphery, preferably over 150 to 210° of the periphery.
14. Apparatus according to any of the claims 5-13, wherein a second through-flow freezer comprises a driving element (W) which is arranged to drive the conveyor
- 10 screw (8) at a speed of from 10 to 50 revolutions per minute, preferably from 20 to 35 revolutions per minute.
15. Use of an apparatus according to any of claims 1-14 for the production of ice-cream mass with solid ingredients.

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